FAA GENERAL AVIATION NEWS

SEPTEMBER 1978

A **DOT** / FAA FLIGHT STANDARDS SAFETY PUBLICATION

THE LONG SPARK

FAA GENERAL AVIATION NEWS

DEPARTMENT OF TRANSPORTATION/FEDERAL AVIATION ADMINISTRATION VOL. 17, NO. 5

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Bernard A. Geier, *Chief General Aviation Division*
David Gelfan, *Editor*
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FAA GENERAL AVIATION NEWS is published by Flight Standards Service, Federal Aviation Administration, Department of Transportation, Washington, D.C. 20591, in the interest of flight safety. The magazine is designed to promote safety in the air by calling the attention of general aviation airmen to current technical, regulatory and procedural matters affecting the safe operation of aircraft. Use of funds for printing FAA GENERAL AVIATION NEWS was approved by the Office of Management and Budget through August 31, 1980. All printed materials contained herein are advisory or informational in nature and should not be construed as having regulatory effect. The FAA does not officially endorse any goods, services, materials or products of manufacturers that may be mentioned. Certain details of accidents described herein are altered to protect the privacy of those involved.

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A Stroke of Light

September is a month of increased storm activity, when pilots can expect to see lightning flashing around the sky in all quadrants. Although official statistics indicate that there is only about one accident a year involving an aircraft struck by lightning, there are many more lightning strike *incidents* each year which are not reported as accidents.

Just how many aircraft are struck each year by lightning and how hazardous is it?

Additional data on this subject is currently being collected by J. A. Plumer, a well-known electrical engineer who has been developing new laboratory methods for analyzing lightning effects on aircraft and gathering reports from pilots. He has already received reports of these lightning strike in 1978:

• *A* Falcon 20 *was struck on the nose cone while flying in a rainshower at 11,000 feet. As the aircraft continued on, the lightning channel reattached to a number of rivets along the left side of the fuselage, passing in front of the left engine intake. The rapid changes in air pressure produced by the hot ionized channel caused the engine to flame out. A relight was not possible until after landing. The aircraft was successfully landed with the one remaining engine.*

• *A* Queen Air, *flying at 10,000 feet in similar conditions lost both DC generators, its DME encoding altimeter, and some communication equipment after receiving a strike in the nose cone.*

• *A BH-125 twin* Hawker *was struck while flying at 33,000 feet in an area of moderate to heavy turbulence and ice crystals. Although airborne radar showed no cells within 30 miles plus or minus 90 degrees from the direction of flight, subsequent information showed that the aircraft had indeed been within a rapidly developing squall line. The lightning first struck the aircraft just above the windshield and reattached at six more spots aft along the fuselage and vertical fin, finally burning a half inch hole in the ventral fin.*

The following article is based on Mr. Plumer's discussions of lightning as an aircraft hazard.

What Is Lightning? Basically, it is a very long electrical spark. It extends between one center of electrical charge in a cloud and another center of opposite polarity charge located in the ground, in another cloud, or sometimes even in the same cloud.

The energy that produces lightning is provided by warm air rising upwards into a developing cloud. As the air rises, it becomes cooler and at the dew point its excess water vapor condenses into water droplets, forming the cloud. When the air has risen high enough for the temperature to have dropped to minus 40°C, all of the water vapor will have frozen to ice. Some of the ice crystals coalesce into hailstones which are heavy enough to fall through the cloud, gathering super-cooled water droplets as they do so.

According to one theory, as these droplets freeze on to a falling hailstone, small splinters of ice chip off, carrying away with them a positive charge and leaving the hailstone with a negative charge. The vertical air currents carry the ice splinters to the upward part of the cloud, leaving a base of the cloud with a net negative charge. The air currents and electrical charges tend to be contained in localized cells, and there may be several such cells in a single cloud. The temperature at the main negative charge center near the base of the cloud will be about −5°C and that of the positive charge center higher up, around −20°C.

When lightning begins, the leader moves in the general direction of an opposite polarity source, but it does not "know" where it will finally strike. There may be several possibilities, and the leader frequently splits into several *branches* on its way.

When the leader reaches the ground (*or other opposite charge center*), the positive charge in the ground rapidly flows into the leader, neutralizing the negative charge in it from the ground up. The head of the region in which this neutralization takes place moves up the leader channel at a velocity of 100 million meters per second, creating a current which reaches on occasion as high as 200,000 amperes. This current is called the *return stroke* and is responsible for the bright flash and loud noise we associate with lightning.

Once within its clutches, you cannot fly away from a lightning flash. When the return stroke passes through the channel, you will experience the bright flash and loud bang so often reported. You will be "let go" only when the flash dies out naturally.

From your perspective in the cockpit, the foregoing events may appear to be caused by the aircraft becoming charged up by some process and then suddenly discharging itself into the surrounding air, accompanied by a bright flash and loud bang. Sometimes at night the corona and streamering will persist and brighten for many seconds, appearing as a fluctuating column of fire snaking outward from the nose of the aircraft. When the flash finally occurs, the corona and streamering cease because the electric field has collapsed, and it appears as if the aircraft has suddenly discharged. Hence the event is termed a *static discharge* and not a lightning strike. However, a rather large amount of electrical charge is necessary to produce either a bright flash or a loud bang—far more than can be stored on an aircraft. So if either a sudden flash or bang occur, you almost certainly have been struck by light-

ning. In fact, the loud bang does not even occur on some strikes; only a "whoosh" sound. This is thought to be a cloud-to-cloud flash whose return stroke occurs less rapidly, producing less current and noise. These are experienced at higher altitudes, where cloud-to-ground flashes are less prevalent.

Lightning Avoidance

Good flying practice and most flight manuals call for avoiding thunderstorms at all costs—not only to avoid lightning strikes but also, and perhaps more importantly, the other manifestations of a heavy thunderstorm: turbulence, hail and rain. Careful study of weather reports and use of airborne weather radar can help you avoid areas of precipitation, but unless you can circumnavigate these by well over 25 miles, an occasional strike may still reach out to greet you. There are many reports of strikes occurring to aircraft operating in cloudy but nonturbulent areas, or between clouds "where no thunderstorms were forecast" and a few reports even of "bolts from the blue." Thus, even if you fly diligently by the book, you can probably expect to be "zapped" sometime during your flying career.

What can you expect to happen to your aircraft if it gets struck by lightning? First of all, electric currents of up to 200,000 amperes will flow through your aircraft between lightning entry and exit points. Owing to its short duration, most of this current will remain in the skin, with relatively little of it diffusing into interior spars and ribs. Fortunately, aluminum is a very good electrical conductor and there is enough of it in the skins of almost any all-aluminum aircraft to adequately conduct this current.

In most cases the only noticeable effect of this current having passed through your aircraft will be small pit marks or holes melted in the skin, where the lightning flash attached momentarily. At trailing edges or other places where the flash can hang on longer, a hole might be melted. Holes can be prevented by making the skin thick enough (0.080 inches will usually suffice), but skins this thick are heavy and are usually used only over fuel tanks or other critical places where arc penetration cannot be permitted.

Another effect might be the crimping or deformation of skins caused by the intense magnetic fields that surround the lightning stroke currents. Also, if the lightning channel becomes drawn alongside the fuselage as it flies ahead and a high amplitude stroke occurs, the consequent overpressure which is produced can cause compressor stalls or flameouts of fuselage-mounted turbine engines when the flash is swept in front of an engine inlet. Navigation lights are frequently struck, and if the globe and light bulb are broken a portion of the lightning current may get into your aircraft's electric power distribution system and damage electronic equipment powered from the same bus.

Indirect Damage

These are all *direct* effects of a lightning strike, but in recent years it has become apparent that there are other *indirect* effects of a strike. Flight and engine instruments and other pieces of sensitive electronic gear have occasionally malfunctioned even though no direct connection with any part of the lightning flash existed. Because electronic systems are increasingly depended upon to perform critical functions in aircraft, the National Aeronautics and Space Administration, Federal Aviation Administration and Department of Defense have initiated research programs to find out more about these indirect effects. Thus far, it has been found that the electromagnetic fields which accompany lightning stroke currents may find their way inside an aircraft, where they induce transient voltages and currents in the aircraft's electrical wiring. This occurs even if the aircraft is all metallic, because there are still a lot of nonmetallic windows through which these fields may enter, and the fields themselves can be very intense.

Lightning Protection

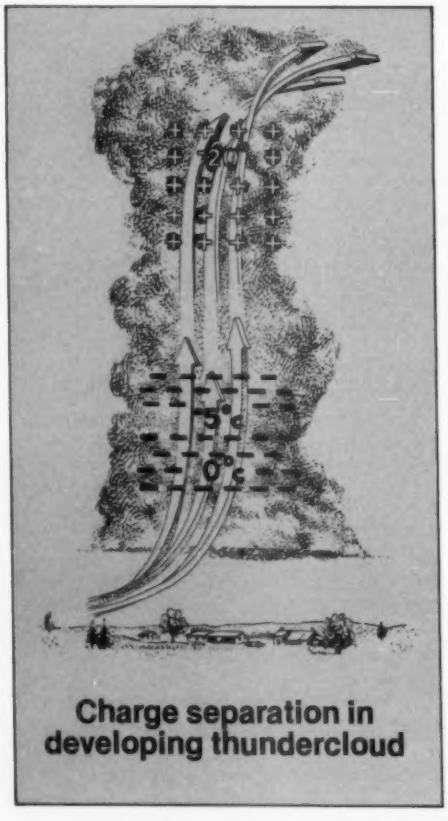
Lightning protection of an aircraft involves two basic principles: One, provision of adequate conductive paths for lightning currents to flow through the airframe between possible lightning entry and exit points; and two, making sure that no hazardous side effects occur when lightning currents flow through these paths. Therefore, protection involves many things—such as selection of the type and thickness of structural and skin metals, the methods of bonding these metals together and the primers and paints used to control corrosion.

Some anticorrosive paints, for example, are nonconductive and may cause sparking when lightning currents try to flow across them between two pieces of metallic structure. Fortunately, the rivets or bolts which fasten structural elements together provide electrical conductivity, and if enough of them are provided, sparking can be prevented.

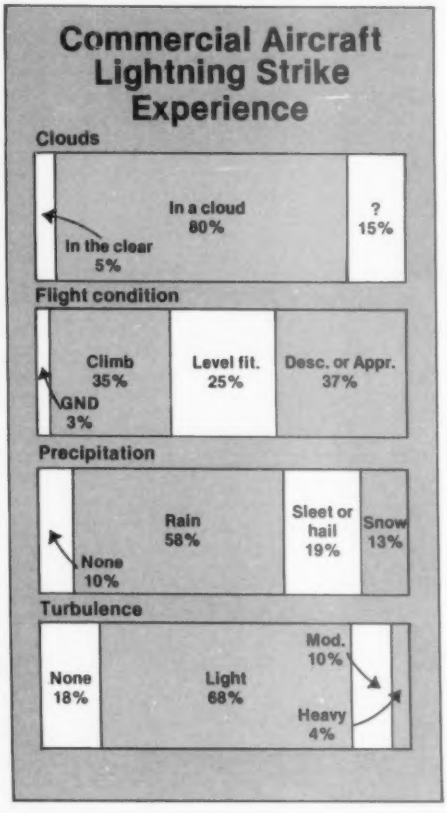
Electromagnetic Shielding

Similarly, the type and degree of electromagnetic shielding for electrical wiring has much to do with its susceptibility to lightning-induced voltages. Thus, wires routed through a plastic section may have to be enclosed in a metal conduit, whereas wires located inside an aluminum structure are often adequately shielded by the structure itself and no additional protection is necessary.

Thus, there is no single "lightning protector" or other device which you can install on an aircraft (as you would a new piece of avionics gear) to make it lightning protected. Instead, protection must be built-in



Charge separation in developing thundercloud



from the start by the manufacturer and involves nearly every aspect of an aircraft's design.

New Materials

Accordingly, there is little that can be done to improve the basic protection of an aircraft after it is designed and built. Occasionally, a new technique is developed which can be retrofitted onto an aircraft to minimize lightning damage to a particular component, such as a plastic nose radome (we will discuss this unique case later), but retrofits are comparatively rare and normally cannot be undertaken by an individual owner. With all of this background, isn't design of lightning protection now a routine matter? The answer is "no," because the design of the aircraft itself is continually changing and current trends make protection a tougher challenge.

For example, advanced composites instead of aluminum are going into skin and structural applications. The high strength-to-weight characteristics of these graphite or boron reinforced plastics make them attractive for structural applications. But in contrast to aluminum, which is a good electrical conductor, or fiberglass, which is an insulator, advanced composites are neither good conductors nor good insulators. Instead, these materials are resistive and will try to absorb energy from the lightning current and dissipate it in the form of heat. They can be adequately protected, but the techniques differ from those used to protect metal structures.

Being poor conductors, composites also do not provide the same high degree of shielding against lightning's electromagnetic fields that aluminum does. This means that the electrical system designer will no longer enjoy the nice shielded enclosure provided by structural design, but must now come up with his own protection for the aircraft's electrical circuits. Again, it can be done, but new methods must be employed.

There are still aspects of lightning which we do not fully understand, and there are new structural materials and electronic devices becoming available whose susceptibility to lightning effects is not known. Therefore, a considerable amount of research is underway at present to learn more about lightning and its effects, and how to design even better protection into new aircraft. While it may add occasionally to already bothersome paperwork, documentation of your lightning strike (or static discharge) incidents on the accompanying questionnaire will help researchers understand lightning better and develop more effective methods of protection. Places where better protection is necessary will then become evident.

Editor's Note: the above article was excerpted in large part from issues of Flight Operations *magazine, with kind permission of the publisher. The accompanying data was provided by FAA.* ■

LIGHTNING STRIKE/STATIC DISCHARGE INCIDENT REPORT

Data submitted on this form will be used in support of research efforts leading to the development of lightning protection systems. Please provide as much information as you can about the incident and conditions at the time, and mail as soon as possible to: J.A. Plumer, President, Lightning Technologies, Inc., 560 Hubbard Ave., Pittsfield, MA 01201.

Date of Incident_____ Aircraft Type _____

Route _____ Altitude_____ Airspeed_____

Phase of flight: Approach_____ Climb_____ Level flight_____ Other _____

Weather: Cloud and % of cover _____ Ceiling (ft.)_____ Tops (ft.)_____ OAT (°C)_____

At time of strike aircraft was: Above clouds_____ Within clouds_____ Below ceiling_____

Turbulence was: Light_____ Moderate_____ Heavy_____ None_____

Precipitation: Rain_____ Sleet_____ Hail_____ Snow_____ None_____

Electrical activity (static) was noticed: Before strike _____ After strike_____ None_____

Was St. Elmo's fire visible before strike? Yes_____ No_____

Personnel experienced: Electric shock_____ Flash blindness_____ Other _____

Description of any interference or outage of navigation, communication or other equipment (compass, autopilot, power system, flight controls, etc.:

Remarks: (Attach additional sheets if needed)

Form completed by _____

MOUNTAIN FLYING II:

The Pressure Trap

The "Trap" is the name given to an elevated basin in the High Sierras of California into which a number of small planes have strayed and ultimately crashed when unable to outclimb the terrain. Blind canyons are always a potential hazard in mountain flying, but not all traps are made of granite hills or vertical slabs. Some are constructed out of purely human characteristics, such as vanity, misunderstanding, family pressure, or an unwillingness to surrender a personal image. These "pressure traps" can form at any time or in any terrain or in any aspect of general aviation flying, but they are particularly prevalent in mountain vacation flying. The factors that make up these traps may seem insignificant to begin with, like innocent-appearing wisps of clouds on the horizon that are the precursers of a major storm.

The typical situation involves a family taking a vacation at a mountain resort, perhaps in the Colorado Rockies, and traveling there from their home in the flatlands in their private single-engine aircraft, flown by the paternal head of the family. There may have been some rumbles of discontent from wife and children when he invested a considerable chunk of their savings to acquire the airplane, but there is no question of its value now in saving them the expense of five airline tickets, plus a car rental in Denver, or the tedium of a two- or three-day drive in the car. After a pleasant flight of just a few hours, they land at Jefferson County Airport, 15 miles north of Denver, and from there it is less than an hour's flight to the little airport at Kremmling near the mountain lake resort where they have reservations for a week.

True, they had to make some sacrifices to go in their own plane as regards baggage. Mother had to do without some of her wardrobe, some of the children's games were left behind, the family Irish setter had to be lodged with the veterinarian, etc., but still there is the pride and excitement of being able to drive up to their own plane and just take off, without any of the bother of ticketing or waiting in line.

At Jefferson County Airport the nearby Rockies look magnificient to the "flatlanders", with scarcely a cloud in the sky. But a weather briefing at the FSS turns up the troublesome news that there are clouds in Corona Pass and westward, with some local showers reported along their intended route to Kremmling. The briefer points out that this is a common weather behavior in the afternoon in the mountains, suggests they park the airplane, remain over night and have another look at it in the morning, when the pass will probably clear.

This news is received by the pilot's family with less than rousing cheers. They have been looking forward to the vacation all year, they can practically smell the pine woods and the fresh, clear lake; and the prospect of spending the night in some motel alongside a dusty, truck-laden highway is not at all appealing. *The pressure starts to build.*

The pilot/father agrees to put off the decision for an hour or two, on the chance that the weather will improve. (He knows this is unlikely but he feels it is necessary to show his sympathy with the family's desires by keeping the option open for a while). The family repairs to the nearest cafe where the parents drink coffee and the children wander around restlessly. There is nothing for them to do, and they begin to regret leaving their games behind. *Pressure mounts.* With each mutter of discontent the pilot feels his image as wise, resourceful leader of his tribe eroding.

Every half hour he checks on the weather but there is no improvement. He finds a tourist folder and reads up on the historic lore of Denver. He extols the pleasures of a night on the town. No one is interested. The children become quarrelsome. His wife, after a period of thoughtful silence, asks him about the insurance expenses and other annual costs of owning their airplane. She does some figuring on the back of a placemat and concludes that they will be spending nearly twice as much on this vacation as they might have spent if they had flown commercially and rented a car. When he questions some of her figures, tempers flare.

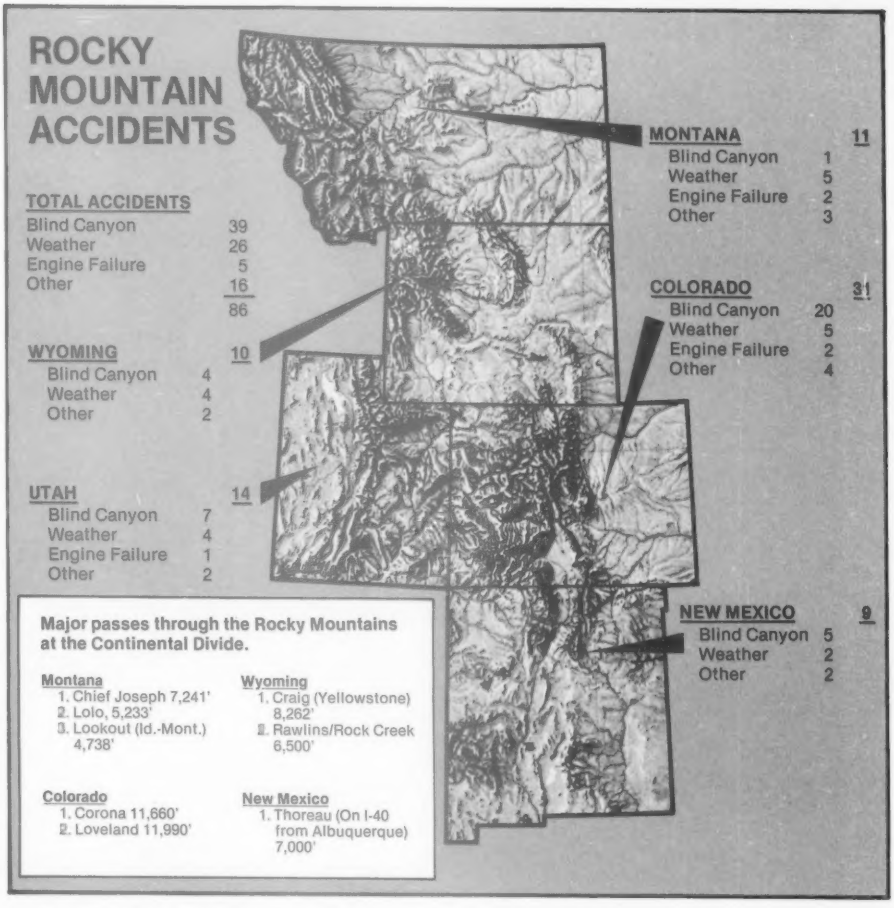
The children are close to fighting now,

everyone is tired and fidgety, and the pressure is very high. Father's repeated suggestions that they check into a motel are met with a chorus of loud "No way's!" Alternately he offers the option of renting a car and driving up to the resort. His wife does some more calculating and announces that this would take at least four hours, including the time needed to locate a car, and that would mean driving over a mountain road in the dark, not to mention missing supper at the lodge, which was already paid for.

The pilot/father is really at bay now. He has run out of options and he knows, in the rational part of his mind, that there is really nothing to do but remain over night at Denver and make the best of it. But he feels that what is at stake here is not merely a lost day of prepaid vacation, but the justification of owning the airplane. If he could say flatly that having the plane may not be economically justifiable, *but the fact is he loves flying, the plane is important to him and he intends to keep it, even if he has to give up some of his other personal indulgences* . . . that might end the matter, and he could escape the trap. But suppose he feels impelled to justify the airplane in terms of reliability, economy and convenience? Then he is just likely to yield to the temptation of "going up to have a look." *Now the trap is sprung.* They all hustle into the airplane, Daddy is forgiven and good-humor is restored. They fly up to the Pass, they find some clouds but are able to fly over them at 13,000 feet, and continue on toward their destination. In the failing light and scattered raincloud they lose their way, stray into a blind canyon, and crash into the mountainside. End of vacation, perhaps end of family.

The case histories of mountain flying accidents are full of such details. The pilot who flies his own airplane and takes his family along should never allow himself to be placed into a position where he must balance economy or convenience against safety, because safety—the lives of his family—clearly outweighs all other considerations. He can never afford to let the sight of a child's tears of disappointment overrule his better judgment. He has to be able to say "No" when safety requires it, and hold his ground—or else not take the plane. Weather is always unpredictable, but nowhere so much so as in the high mountains. Weather reporting stations are few, and weather conditions may vary drastically from one adjoining valley to another.

Accidents related to weather and insurmountable terrain are especially prevalent in the Rockies because of the vast area they cover as well as because of their high elevation. Unlike the California mountains which form a rim around the interior valleys of the state (see "Special Mountain Flying Issue", August 1978) the Rockies form a more or less continuous ridge, the so-called



Continental Divide, which extends from the Mexican border to Canada. Of the 86 mountain flying accidents in this region from 1975-1977, only five were due to mechanical failure. *The pilot is the key to a safe crossing.*

The Divide is a formidable barrier to light plane pilots crossing the western third of the nation—as it was to their pioneering forebearers who traveled west in covered wagons. The mountains hunch up to their greatest heights over Colorado, which is second only to California among all 50 states in the number of mountain flying accidents reported during the past three years (31 accidents, 17 fatal). Other Rocky Moun-

Dream Lake, in the shadow of 12,713' Hallett Peak, draws vacationing pilots to Colorado.

tain States, in their order of accident prevalence for this period are Utah (14), Montana (11), Idaho (10), Wyoming (10) and New Mexico (7).

Colorado's high toll may be due in part to the fact that the Centennial state is centrally located in the east/west traffic flow, and partly to the popularity of the Colorado Rockies among vacationing pilots. But it is also due in large measure to the sheer height of its mountains.

Traveling westward across the central plains, one flies over land that rises gradually, almost imperceptibly. At Denver's Stapleton Airport the surrounding terrain appears almost as flat as Kansas, but the elevation is 5,330′. Immediately to the west stand the Rockies, range after range of loftly peaks, interspersed with hundreds of high valleys, plateaus, and basins. There are more than 50 peaks over 14,000′. The Continental Divide, which runs pretty much north/south through Colorado, has no passes in this state under 10,000′. The minimum en route altitude for IFR flight west of Denver is 16,000 feet.

Lower routes to the north and south

Pilots who are transiting the area and wish to fly at lower altitudes can detour by way of Santa Fe and Albuquerque to the south and follow I-40 over the Divide; or up through Wyoming over Laramie and Rawlins to the north, along I-80.

In Wyoming the Continental Divide moves northeasterly through the state from Rawlins into Yellowstone Park at the Montana border. Craig Pass in central Yellowstone crosses the Divide at 8,262′. In Montana the Divide follows the Idaho border west and then northwesterly up to Chief Joseph Pass (Elv. 7,241′) and then moves northeasterly toward Helena and MacDonald Pass (Elv. 6,325′). After Helena the Divide moves northeasterly into Glacier National Park on the Canadian border. Passes are generally in the 6,000′ range. In western Montana the Bitterroot Mountains are a formidable and lengthy range lying along the Idaho border, with major passes at Lolo (Elv. 5.233′) near Missoula and at Lookout Pass near Mullan (Elv. 4,738′) on I-90 leading to Spokane.

Accidents occur at scattered points in the northern Rocky Mountain states. Elevations are not high compared with Colorado, but turbulence is a frequent problem over the Divide, especially over the Glacier Park mountains between Cut Bank and Kalispell. This route is often used by pilots bound from or returning to Spokane, and when turbulence is reported they are advised to detour south of the Park. The sparsely settled nature of much of this terrain, and the presence of large Wilderness and Primitive Areas, points up the importance of filing flight plans and maintaining the ELT in operating condition to aid rescue efforts, in the event of a forced landing for any reason.

Density altitude is also a summer problem in this area, especially for low-powered aircraft. For example, the pilot of a 65 hp Aeronca *Champ* was attempting a go-around at a dirt strip near Athol, Idaho, in April of last year when she found herself unable to outclimb the adjoining terrain. The aircraft struck a tree, and the pilot was seriously injured. She stated later that the engine rpm would not exceed 2,000 and assumed mechanical problems. Investigators determined that with the current density altitude (over 5,000′) the engine was not capable of turning up more than 2,000 rpm.

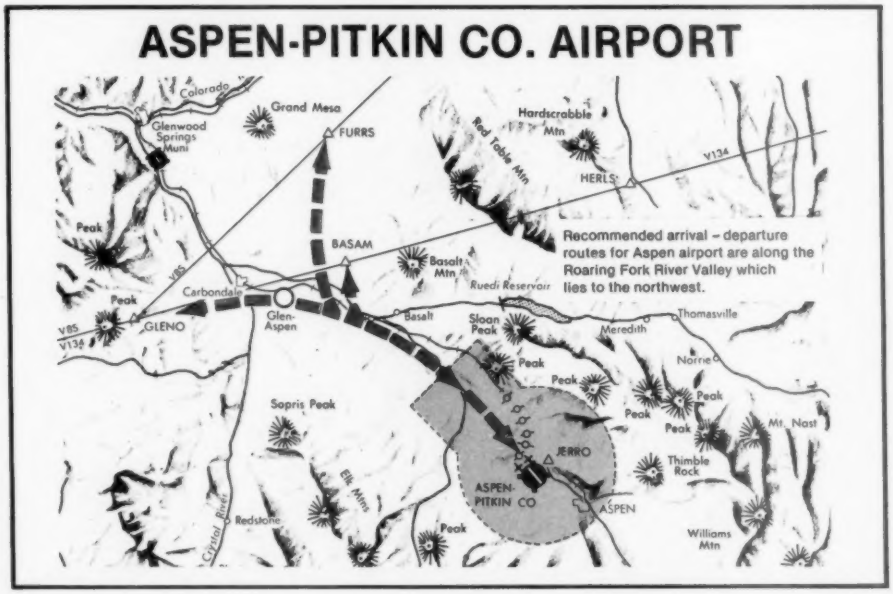
The Central Colorado Routes

The lowest of the central routes over the Rockies is via Corona Pass (11,660′). Gateway to this route is Jefferson County Airport, just north of Denver and the site of FAA's general aviation district office. At the entrance to the pass ground elevation over the road moves gradually up the valley as far as the East Portal (elevation 9,090′), but then disappears abruptly into lengthy Moffat Tunnel. Over the tunnel the terrain rises swiftly to a crest of 11,660′ at the crest of the Divide. After Corona the terrain descends and broadens out somewhat toward Granby and the Kremmling VOR (generally effective above 14,000′ only). From Kremmling pilots can follow Highway 40 north to Steamboat Springs via Rabbit Ears Pass (Elv. 9,426′) and on to the Salt Lake; or head south via Gore Pass (Elv. 9,570′) to Eagle and then follow the railroad and I-70 to Glenwood Springs. From Glenwood they either proceed south to Aspen or continue to Grand Junction and points west.

Flying in or out of Aspen (Pitkin County Airport) is an experience unlike anything most general aviation pilots have ever known. This lack of preparation has taken a grim toll in lives and wrecked aircraft. The 7,793′ elevation of the airport frequently has a density altitude of more than 11,000′ in the summer months, which causes a serious deterioration of performance in non-turbocharged aircraft. Aspen is located at the end of a large valley that is rimmed with mountains rising several thousand feet over the runway elevation. The safest approach and departure routes are by way of Glenwood Springs, to the northwest. The suggested VFR route to Aspen is over V-8 via Glenwood, from Denver in the east or Grand Junction to the west. The IFR routes are also along V-8 at 16,000′ or else from Denver along V-134, at 18,000′.

The Seven Deadly Sins of Mountain Flying

Avarice	—not knowing when you have had enough for one day.
Gluttony	—carrying more weight on board than the plane can safely lift.
Lust	—over-eagerness to get somewhere for no valid reason.
Miserliness	—unwillingness to invest in supplemental oxygen.
Pride	—assuming you know more about flying the mountains than you do.
Sloth	—not troubling to file a flight plan or get a thorough briefing.
Wrath	—childish annoyance with the weather, leading to unwarranted risks.



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PILOT SELF BRIEFER

Pilots who fly into and out of Aspen, Colorado are able to get a graphic lesson in the local terrain via the "Pilot Self Briefer", a show-and-tell program developed by Gary Koch, the FAA Accident Prevention Specialist in the Denver GADO. A seven-minute casette of movie film which is shown on a TV-like screen with audio commentary, can be activated and watched by the pilot at his own convenience at the Aspen airport. Designed to help decrease mountain-flying accidents in the area, the program includes movies taken from the air during approaches to and departures from the Aspen airport and shows recommended route choices and also pitfalls to avoid.

Enthusiastic acceptance of the Aspen "Pilot Self Briefer" has triggered future plans for it to be adapted by other GADO's to areas in their districts where the terrain engenders special flight problems.

Staying oriented requires careful navigation in the Rocky Mountains where many high-walled basins and valleys look alike. Patches of snow are common even in late summer.

Every year several persons die in unsuccessful attempts to short-cut these recommended routes, especially by trying to enter or leave Aspen Valley VFR over Independence Pass to the southeast (Elv. 12,093′). Frequently turbulent air and sudden storms add to the problems of high density altitude which make such flight dangerous for light aircraft. FAA's Rocky Mountain Region publishes a pilot "handout" which is an indispensible aid to pilots flying into these mountain resorts for the first time. Salient points include:

Airport Operations. The single runway (15-33) at Aspen is 127′ higher at the southern end. Aircraft normally land on 15, which makes the rollout uphill; and depart on 33, downhill. There are no runway lights for public use, and night operations are not authorized. The airport is tower-controlled, and operates *dawn to dusk only*.

Lighting. Seven lead-in lights, beginning about five miles northwest of the airport, are tower activated and lead in to runway 15. There are no NAVAIDs at the airport. The closest VOR is at Kremmling, 55 miles north. Runway end identification lights are located at the threshold of runway 15 only.

Weather. Local weather observations are taken by the Aspen Tower during hours of operation and forwarded to the Denver FSS. From any telephone in Colorado pilots may dial the FSS without charge (on 1-800-332-1854) for a weather briefing on Aspen. *Caution*. Arriving or departing Aspen in marginal VFR conditions is risky. Local pilots like to see at least a 3,000 ceiling, with five miles visibility and improving, before venturing out.

Radar coverage. Coverage from the Denver Center for Aspen starts at 13,000′ to the northwest of Aspen, and 16,000′ over the airport and to the east.

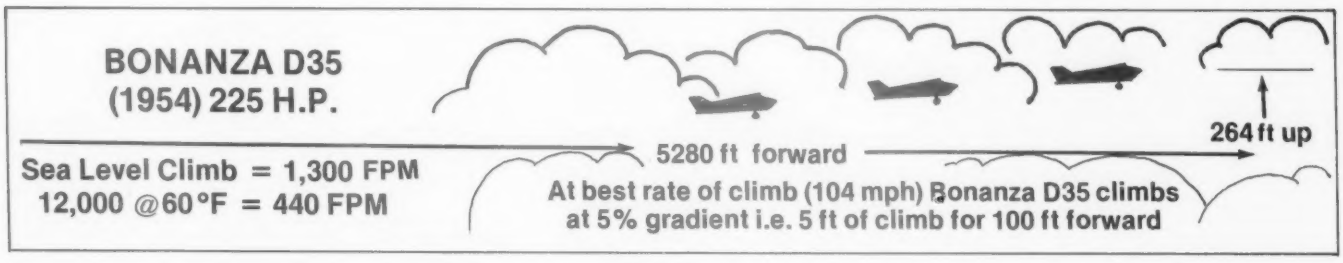
Local control. Arriving aircraft should call the Tower about 15 miles from the airport and turn on landing lights at this time, to assist controllers in visual spotting. Advise the Tower if you wish the lead-in lights turned on.

(For complete details write for *Flying to Aspen?* See also, *Tips on Mountain Flying.* Both are available free from FAA's General Aviation District Office, Jefferson County Airport, Bldg. #1, Broomfield, CO., 80020.)

For pilots traveling west of Denver, in transit or on vacation in the Rockies, the most direct VFR route is over I-70. The road climbs steeply immediately after leaving Denver, and the valley floor is soon surrounded by peaks over 13,000 feet. Gray's peak, just past the Eisenhower Tunnel near Loveland Pass, measures 14,270′. After the tunnel a fairly broad valley opens up leading to Kremmling and points north and west. The railroad continues southeast to Leadville, over Fremont Pass (Elv. 11,820′). These routes can be dangerous for inexperienced airmen or low-powered aircraft. The terrain rises and narrows with deceptive swiftness.

In July of last year a Beech *Bonanza* landed at Jefferson County Airport with a family of four on board. The family was returning to their home in California after an extended flying vacation, visiting friends and relatives throughout the midwest. The pilot, an engineer, held a commercial certificate with an instrument rating and had logged 510 hours of flight time. The vacation had been an immense success, and they intended to head for home after sightseeing over the Rockies.

They took off the next morning on a warm, clear day with little wind reported enroute. The pilot elected to cross the Divide at Loveland Pass (Elv. 11,990′) and fly over Leadville and some of the other historic mining towns southwest of Denver. The road at the Pass goes through the Eisenhower Tunnel at about 11,000′ while


BONANZA D35
(1954) 225 H.P.
264 ft up
Sea Level Climb = 1,300 FPM
12,000 @60°F = 440 FPM
5280 ft forward
At best rate of climb (104 mph) Bonanza D35 climbs
at 5% gradient i.e. 5 ft of climb for 100 ft forward

the mountain ridge above rises to 12,071′.

A hiker in the area reported seeing a *Bonanza* approaching the Pass at an altitude that seemed to him much too low:

"It (the aircraft) was climbing steadily but not rising as rapidly as the terrain ahead of it. I wondered whether the pilot realized that fact. The droning of the engine was smooth at all times, and the pitch of the droning remained virtually constant. I had the impression, though, that the engine was not delivering the power the pilot expected. Within a few seconds . . . the plane turned perhaps 30° to the pilot's left, banking at a moderate angle, then abruptly turned perhaps 30° to the pilot's right, again banking at a moderate angle. I had the impression that the plane was close to stalling after the pilot began the second turn. . . ."

Another witness, a pilot who was driving on the road toward the tunnel, saw a *Bonanza* at this time flying ahead of him, and also had the impression the airplane was too low to clear the pass:

"As I approached within one-half mile of the tunnel with the aircraft in full view at all times, it appeared to me he should turn around. But at a 45° angle I couldn't be sure if he would clear. At this point he stalled, his right wing dropped at a fast rate and he went into a spin to the right, plunging vertically down about 250 to 300 feet above the tunnel and 500 feet to the right . . . a large cloud of dust arose, followed almost immediately by flames."

The wreckage was located at the 11,700′ level on a 40° slope, about 300′ below the Pass. There were no survivors.

Travelers in Loveland Basin at the time of the crash reported good visibility, with cumuli beginning to coalesce at a level about 1,000′ above the Divide and "occasional brisk breezes from the south and west." The official on-site estimated temperature was between 55° and 60° F.

The investigation of this accident by representatives of the National Transportation Safety Board disclosed no mechanical or physiological problems that contributed to a cause determination. Their report concluded that the pilot "misjudged distance, speed and altitude", and cited "improper in-flight decisions or planning."

Pilots who know the area well have pointed out the difficulty that inexperienced airmen have in relating their rate of climb to the rise of the terrain below, especially in the high passes where the horizon may be difficult to ascertain. Unless the pilot maintains good *attitude awareness*, the aircraft may approach maximum climb configuration without his knowledge. Also, the angle of slope in the high mountains is not easy to estimate, particularly where there is heavy forestation, snow or rock slides. Impaired judgment, as a result of oxygen depletion, is always a possible factor, and one which may leave no physical evidence to be discovered in the eventual autopsy.

Routine use of supplemental oxygen over high mountains eliminates the temptation to "slip over" high terrain or clouds without it—a practice that often leads to hypoxia.

Air-breathing machines, such as aircraft engines, relate to the density altitude—not to the pressure altitude or elevation. For example Loveland Pass, with an elevation of 11,990′, may have a density altitude of 15,000 in midsummer. Flying over the Pass with a minimal 1,000′ clearance over the ground would place you at 16,000′ d.a.—above or near the service ceiling of most non-supercharged single-engine aircraft.

The *Bonanza* in the accident cited above, for example, had a rated service ceiling of 18,000′, but its performance characteristics would decline significantly long before it reached its ceiling—at which point no further climb would be possible. With the outside air temperature estimated at 55° to 60° F at the time of the accident, the density altitude would have been in the 14,000′ to 15,000′ range. Climb capability could have been reduced to as low as 450 feet per minute—compared with 1,300 fpm at sea level. With the low climb rate the aircraft would travel approximately *a mile in order to climb 300 feet.*

Similarly, to make a 180° turn safely under these conditions might require a valley width of at least a mile, many sections of the valleys leading to the high passes do not have this much room. If the witness was correct in stating that the *Bonanza* in this case attempted first a left, and then a right turn, before stalling—then the pilot may have realized too late that he was boxed in. The stage was now set for one more unhappy ending to a family mountain flying vacation.

Pilots seeking a shorter route from Denver sometimes fly over Loveland Pass and then proceed west via Leadville and Twin Lakes. To fly over this route it is necessary to climb over still higher Independence Pass (12,095′). This route is overshadowed by some of the highest peaks in the entire Rocky Mountain range. It is not recommended for pilots who are unfamiliar with the mountains, or who do not have supplemental oxygen on board.

Lack of oxygen, or hypoxia, is believed to be a factor in many of the mountain flying accidents in this area which involve pilot judgment. The ability to make appropriate decisions (including the decision that continued flight in the present circumstances without supplemental oxygen would be dangerous) is demonstrably weakened by oxygen depletion. Any aircraft crossing the central Rockies is going to be in the 12,000′ to 14,000′ range for certain periods, and these periods can be lengthened by the unanticipated presence of low cloud layers in valleys or passes, navigation errors, or obscuration at the destination airport. (In the back country of the mountains some of the airports are at unusually high elevations. Example: Lake County at Leadville—9,995′.) It is not unusual for local rainshowers to obscure these airports while the remainder of the route is clear.

Many experienced mountain flyers make a check of the supplemental oxygen system one of the *must* items on their preflight checklist, and if they do not get a green light they will not go. Some Colorado pilots routinely don their oxygen mask as soon as they approach the high passes, knowing how insidious the gradual onset of hypoxia is, how difficult it is to detect for oneself, and how likely it is to precipitate a flying blunder. The high mountains are very unforgiving of mistakes, as the early pioneers learned at a dear cost. Nature has not changed.

(Prepared with the aid of FAA's Rocky Mountain Region. Forthcoming articles in this series will discuss flying in the Cascades, Alaskan Range, and the Appalachians.) ■

Famous
FLYERS

Joe Barrows and his Aerial R.F.D.

On an early winter's day in 1930 the little mining village of Telegraph Creek, on the Stikine River in northern British Columbia, near the Yukon, was agog at seeing two airplanes circle overhead and come in for a landing. They were piloted by Joe Barrows, a former Forest Patrol flier from California, and Harry Blunt, a retired wheat farmer from eastern Washington. The airplanes were en route to Fairbanks, flying north through the interior over an uncharted route.

They had left Vancouver some days before, heavily loaded. In his sleek, bullet-shaped *Fleetster* Joe carried two passengers, Mr. and Mrs. Edward Lowe, his budding Alaskan air service's financial backers. Harry's *Fairchild* contained two pairs of airplane skis and their mountings, plus all the winter gear which Seattle store-keepers had managed to sell to these 'cheechakoes'.

At Prince George in central British Columbia a fall of snow had delayed the pilots while they installed the skis. Then a freak Chinook wind melted the snow and the pilots had to change back to wheels. To reach Telegraph Creek they had to fly over country virtually unknown to aircraft.

Joe Barrows' newly formed company, "Pacific International Airways", was a successful bidder on mail contracts for settlements along the Yukon and Kuskokwim Rivers, in the remote back country of west central Alaska; service to begin the following autumn. He was going north now to establish bases in Alaska, to check the routes, and to open freight and passenger offices. When he stopped in Seattle a reporter from the Seattle Times had requested him to join in the search then under way for a downed north-country pilot, Paddy Burke, who was lost with two passengers somewhere in the Liard River area of the Yukon.

At Telegraph Creek Barrows noticed that nearby lakes were freezing, making good emergency landing sites for search operations. After a fall of new snow the pilots decided to remount the skis. The planes were readied, the engines warmed up, and Harry Blunt took off over lake ice. Hardly airborne, the Fairchild crashed into a hillside beside the lake. Gunning the *Fleetster's* motor, Joe began taxiing across the lake to the rescue (his two passengers had been left in the village). In the middle of the lake the new ice gave way and the *Fleetster* dropped through. Struggling in the icy water, Barrows managed to open a hatch above the cockpit and climbed out on the wings which were holding the plane from being completely submerged.

Both pilots were rescued and put to bed in the small infirmary at Telegraph Creek. Blunt had both legs broken, badly smashed when the engine folded back on them, and Barrows was rigid with a post-immersion attack of inflammatory rheumatism. But he could not lie idly in bed while the *Fleetster* needed to be salvaged and while his partner was desperately in need of a doctor's care with no doctor available within 100 miles.

Unable to walk, the pilot rode to the lake on a dog sled and from the sled directed salvage operations. A channel was cut in the ice and the airplane pulled to the shore. A tent of canvas was spread and firepots beneath began the task of thawing out the solid chunks of ice which filled the fuselage and the wings. Then Joe, lying on his side and able to use only his left hand, since the right was too stiff with rheumatism to hold a tool, began the work of checking the engine, the wiring, tightening bolts and preparing the *Fleetster* for flying.

Two weeks later at the airstrip in Whitehorse, in the Yukon, Everett Wasson, a bush pilot landed with a Canadian Mountie on board and Paddy Burke's body, which he had brought in from the Liard River crash site. Just behind Wasson, another plane circled overhead and a blue *Fleetster* came in for a landing. Attendants ran to the plane and spectators gasped when Harry Blunt was lifted out, and gasped again as Joe Barrows, also unable to walk, was lifted out behind him. Flying with only his left hand, unable to use his legs on the rudder, Joe had brought the *Fleetster* across unfamiliar country to the Yukon. Water and ice-damaged, none of the panel instruments were working, so the flight had been made entirely by visual reference. A passenger sitting beside the pilot had pushed the rudder bar at Barrow's command.

The Whitehorse doctor hospitalized Harry Blunt and splinted his legs. Joe Barrows was ordered to bed at the hotel, where his wife had spent a month waiting for him. Immediately after Christmas Harry was placed aboard the train for Skagway, to board a ship for Seattle, but Joe, although still badly crippled, returned to Telegraph Creek to pick up his backers, Mr. and Mrs. Lowe. Then he continued on to Fairbanks where the *Fleetster* went into a shop for repairs. This was the beginning of his Alaskan career, in which he earned a reputation for dogged determination and ingenuity that became a legend.

Born in San Jacinto, Calif., in 1903, Joe Barrows had learned to fly in southern California while still a teenager. He barnstormed, instructed students, and carried passengers from roadside fields in San Diego and Los Angeles. In 1924 he met a girl from Ashland, Oregon, to whom he became

engaged. The entire summer was spent in repairing an old war-surplus *Jenny*, powered with a Hispano-Suisa motor, and attempting to fly it north to join his fianceé in Oregon. The motor continually over-heated, forcing him down every few miles, but Joe would not abandon the airplane. It was late September before he reached Ashland where the couple were married. Joe and his bride started across the mountains in the *Jenny* to Crescent City on the coast, where he hoped to barnstorm and carry passengers at the county fair to earn a little money.

The couple had two forced landings from mechanical failures in the first 30 miles. Then, above the Coast Range Mountains, Joe saw that the western slope was completely fogged in, so he turned back, ran out of gas, and landed on a mountain top. He and his bride spent two days walking out, down to the coast. Later, with team and wagon, they salvaged the plane, taking it apart and loading it in a raging snowstorm. Joe got it back in the air.

Joe's next year was spent flying up and down the coast from Coos Bay to Eureka, carrying passengers and helping Verne Gorst survey a route for his future airline, which eventually grew into United Airlines. In 1926 Claude Ryan hired him to fly a four-passenger *Standard* between San Diego and Los Angeles. He also helped test the first Ryan monoplanes, and carried a photographer to map the Colorado River in one of them. Later he flew for the Forest Service, dropping fire fighters in remote regions in northern California. He was one of the first pilots to operate from the Alameda tide flats upon which today is the sprawling Oakland International Airport.

In 1929, quite by accident, he entered the Oakland-Cleveland Air Races. Flying a Fairchild 51, he had two passengers bound for Cleveland, one carrying heavy photographic equipment, when he heard that not enough contestants had entered the race. So two hours before starting time he registered.

Joe Barrows in the cockpit of a Ryan **Monoplane** while mapping the Colorado River in 1926.

When he landed in Cleveland he was surprised to find that he had finished second.

In 1930 the lure of Alaska called him north, and he formed his "Pacific International Airways."

His company planned to build a hangar in Fairbanks where the mail planes could be serviced during the winter, but as the effects of the economic depression of the 30's were deepening, his backers withdrew financial support for the P.I.A. Joe flew to New York to try to get financing to enable him to fulfill his Alaska mail contracts, but none was available. Instead of having a warm hangar in Fairbanks, the operations were moved to the Tanana River ice at Nenana, the closest point on the railroad for the down-river operations. The profitable freight and passenger service which had built up during the summer in Anchorage had to be abandoned. A flimsy wallboard shelter was erected on the ice near the railroad bridge, with a stove inside, where the mechanics worked during the winter in sub-zero temperatures.

Barrows, as manager, flew as many hours as did any of his pilots, Al Monsen, Alex Holden, and Lon Cope. When Alex Holden left in the middle of the winter, Percy Hubbard was hired in his place. Al Monsen flew the mail route down the Kuskokwim which called for one round trip a week. Two round trips were required between Nenana and Unalakleet, on the Bering Sea shore. The contracts, which had been obtained in direct competition with dog team drivers, were not contracts for air mail. They were actually rural free delivery contracts, requiring stops down the Yukon at every prospector's cabin or hut where a tattered flag on a stick indicated a letter was to be picked up or delivered.

Mail stop for Pacific International Airways of Alaska at Manley Hot Springs, near Fairbanks, where the airplane was met by a dog team.

Pilots Monsen, Barrows and Hubbard

In midwinter temperatures plummeted to sixty below zero, weather reports were inadequate or completely lacking, and the planes carried no radios. They took off and flew as far as they could before being forced down because of snow or zero visibility. At one time Joe Barrows took three days to fly one hundred miles down to Tanana and back.

The winter's mail contracts were completed with the break-up of river ice in the spring of 1932, and Joe went to New York again to sell his airline. A contact he had made with Charles Lindbergh in Nome, when the Colonel and Anne flew "North to the Orient" in the summer of 1931, resulted in a successful sale to Pan-American Airways. After several months of training along the Mexican and Central American routes, and in the shops at Miami, Joe returned as Pan Am's maintenance superintendent at the Fairbanks terminal.

Four years later Joe was transferred to the Miami terminal of Pan-American. Here he attended classes in navigation and meteorology, took instrument flying instruction in the Link trainer, and began flying the routes around the Caribbean. With a senior captain's rating he was again transferred, this time to Alameda where he began flying the China Clippers across the Pacific. In 1938 this route took six days, with stops at Honolulu, Midway, Wake, Guam, Manila, and on to Hong Kong. He continued flying the Pacific for more than 20 years, until he retired in 1958 and settled at his present abode in Santa Cruz, Calif.

Though he actually spent only a few years in Alaska, between 1930 and 1936, his determination to make flying succeed in that then remote land of difficulty and opportunity was an inspiration to all who knew him as a man who never gave up on an airplane and never let a partner down. ■

BRIEFS

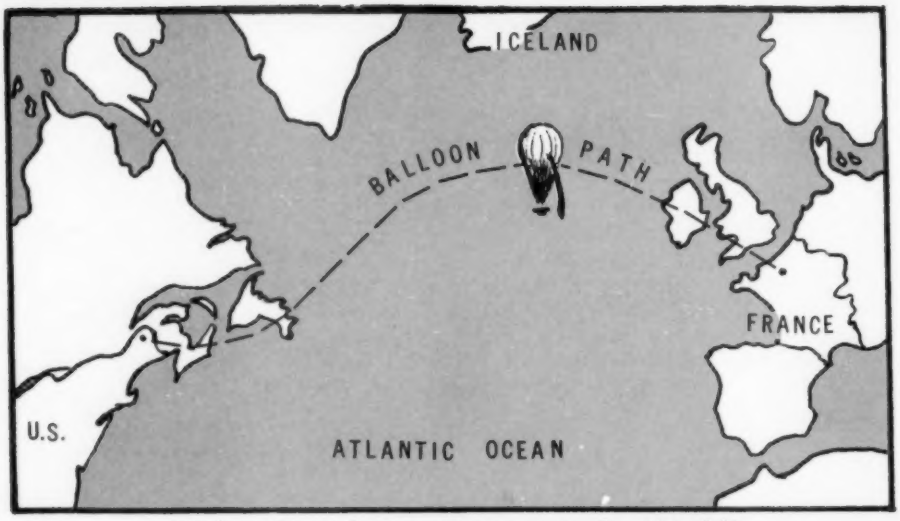
ELT ANTENNAS. A Narco Service Bulletin notes that some aircraft owners have installed the Narco ELT-10 using only the self-contained antenna. This antenna is meant to be used by survivors after the ELT is removed from the aircraft, and is not intended as the primary ELT antenna. An external antenna is recommended for adequate signal radiation when the unit is activated by emergency conditions.

LOW FIDELITY. Avionics and all components thereof, including speakers, are precisely engineered and must be just as precisely installed if they are to render the service for which they are intended. A Cessna pilot learned this lesson not long ago when he complained about the poor quality of sound from his radio. When his repair station embarked on a trouble-shooting project they turned up the fact that four holes had been punched in the speaker cone to provide access to the nuts securing it. The replacement was properly installed: with "U" type speed nuts which left the speaker intact.

SQUAWKING IS SAFER. Pilots who fly transponder-equipped aircraft are reminded that, for safety's sake, transponders (and altitude encoders, if available) should be kept on from takeoff to landing on every flight, using either the VFR code (1200) or one assigned by air traffic control (ATC). Two recent near midair collisions near busy airports involved pilots of VFR aircraft not in radio contact with ATC, who had transponders and altitude encoders which were turned off at the time. The radar control facilities did not detect the primary radar targets of the VFR aircraft and were unable to issue traffic alerts to the IFR aircraft. In each case the VFR pilot believed he should turn his transponder to the "on" position only if requested to do so by a controller. This is false. Transponders should be on (not stand-by) at all times, during flight, unless instructed otherwise by ATC.

CAUTION, FRESH PAINT. Normally a newly-painted aircraft is a thing of joy for its owners, but there have been a few cases where the paint resulted in more problems than pleasure. In a typical case, after the left main gear of a Piper Arrow collapsed during landing, an inspection disclosed that the gear down-lock hook was contaminated with paint from a recent renovation. Paint was also found on gear struts, switches, link assemblies and bearings. Also, the control surfaces had not been balanced, which often needs to be done after painting, and the fuel filler decal was not restored. Furthermore, no maintenance entry had been made in the aircraft logbook stating that the craft had been painted—a requirement under the FARs.

FLYING FILMS. "Put Wings on your Career" (about aviation maintenance), "Low Level Wind Shear" and "Discrete Address Beacon System" (tommorrow's radar system) are three recent FAA films available without charge to the public. A catalog of all FAA films may be obtained by writing: DOT Distribution Unit, M-443.1, Washington, D.C. 20590.



Today the Atlantic, Tomorrow the World?

Three businessmen from Albuquerque, who also happen to be pilots in their spare time, are mulling over the size and type of balloon it would take to circumnavigate the world nonstop. Following their historic achievement of August 17, when they made the first successful crossing of the Atlantic Ocean in a balloon, the trio of aeronauts are now tempted to challenge the elements in a globe-girdling voyage.

Their 11 story high silver and black "Double Eagle II", flying both United States and French flags, flew 3,233 miles (from Presque Isle, Maine) in 137 hours and 18 minutes before touching down near dusk in a wheat field at Miserey, France, 50 miles west of Paris, amid mobs of cheering Frenchmen who had been trailing it along country roads.

Two of the airmen, real estate developer Ben Abruzzo, 48, and mining executive Max Anderson, 44, had attempted a previous Atlantic crossing in September 1977, but were forced to ditch near Iceland after 61 hours. For their latest flight they added a third crew member, 31-year old hang-glider manufacturer Larry Newman. All three are veteran pilots.

According to the crew, the only serious problem encountered on the "near-perfect" Atlantic flight was "when we iced up badly about halfway across the ocean. It cost us a lot of ballast and height." Among the jettisoned ballast was a hang glider which Newman had brought along suspended from the gondola, and which he had hoped to use for his descent at the end of the flight.

Seven lives have been lost in the 17 unsuccessful previous transatlantic balloon attempts. FAA officials in Maine, who issued a Special Airworthiness Certificate for the "Double Eagle II," attributed this crew's success to superb preparation and the experience gained in the previous try, plus the size of the balloon. The huge envelope was the largest ever used for such a flight—112 feet high and 65 feet in diameter—but it was ripped to shreds by souvenir seekers at the landing site. However, parts of the envelope and the red and yellow gondola—the same used in last year's flight—were salvaged for display at the Smithsonian Air and Space Museum.

As the balloonists returned home (via the Concorde, as guests of Air France) the main topic of discussion was: *How big a balloon would it take to carry them around the world?*

Air Taxi Rule Extended

The Federal Aviation Administration has extended until June 30, 1979, the special rule that permits commuters and air taxis to operate certain large aircraft with 30 or fewer seats without a flight data recorder, cockpit voice recorder or ground proximity warning system. FAA presently is in the process of overhauling the commuter and air taxi rules in FAR Part 135, and believes these carriers should not be subject to additional requirements until the project is completed and new standards are published.

Color Radar To Be Tested

Color is being added to FAA radar displays in a test program aimed at helping controllers distinguish between different types of information on the scopes. Six radar units are being modified for the test program which will be conducted at the Washington Center starting next spring.

Three colors—red, orange and yellow—will be added to the present displays which show all data in green. Red will be used for map lines and navigational aids and orange for weather. Yellow and green will be used for aircraft data blocks, which show identity, altitude and other information on aircraft. Any future use of the color display will be determined after the tests are completed and evaluated.

VOR/DME Best Nav Bargain

Modernization of the present VOR/DME system provides the most "economically attractive" choice of short-range air navigation systems for the immediate future, according to a study conducted for FAA.

The study, which is part of an overall FAA program to evaluate factors involved in choosing a future air navigation system, found that, based upon an initial assessment of costs, a second generation of the present VOR/DME system will continue to be cost-effective over the next 25 years. Rapid transition to alternate plans, on the other hand, could cost civil airspace users several billion dollars. Other systems evaluated include NAVSTAR Global Positioning Satellite system (GPS) which is being developed by the Defense Department, and the ground-based LORAN C and Omega Systems. Relative cost factors will be reassessed as new data becomes available.

Maintenance Symposium

A new type of annual maintenance symposium will have its first meeting at the Skirvin Plaza Hotel in Oklahoma City on October 24, 25 and 26.

Sponsored by the Wyoming-based Aviation Maintenance Foundation, the symposium is especially designed to help familiarize maintenance personnel with the great variety of industry products. Approximately 75 manufacturers will exhibit their wares.

For information and preregistration form write AMFI, Box 739, Basin, Wy. 82410.

THEIR NUMBERS ARE UP. Accident Prevention Bulletin Board for the Denver area is one of the first of some 1,000 being installed at airports across the country. The red, white and blue boards make it easy for transient pilots to contact the local FAA Accident Prevention Specialist or the civilian flight counselor who can be of practical help in planning a flight into unfamiliar and difficult terrain.

• Close Encounter

I recently had my first encounter with wake turbulence from a large jet, in spite of being well-informed (I thought) on the subject.

I saw the jet cross five miles in front of me, 90 degrees to my projected flight path and 500 feet above it. I admit the thought of wake turbulence crossed my mind briefly, but I dismissed it as a factor because I figured the wake would fall below my altitude, or dissipate, before I got there.

On that calm day I apparently guessed wrong. Three or four minutes later my airplane received a single jolt, so severe that the seatbelts cut into our laps, our heads snapped back and loose items flew about the cabin. We were shaken, but unhurt, and the airplane seemed to be flying all right, so we continued to our destination airport.

My questions now are these: Could the airplane be damaged by an encounter like this? Is there anything I should do now? If the situation were to arise again, what action should I take to prevent—or minimize such an incident?

Name withheld
New York

Yes, airplanes can be damaged in this way. We suggest (1) you explain what happened to your airplane mechanic and request a "turbulence inspection" to be sure there is no damage; and (2) in the future, if you think you may pass through wake turbulence either climb to a higher altitude or make a turn that will take you away from the other aircraft's wake. If conditions make this impossible, slow down *to maneuvering or rough air speed, (just as when flying in any other type of turbulence) to minimize danger to the aircraft.*

• Shear Definition

In your article on the subject in the May issue you state that the name "wind shear" comes from a similarity with freshly sheared wool. Would you accept Webster's Dictionary definition of shear as "an action or stress, resulting from applied forces, which causes or tends to cause two contiguous parts of a body to slide relatively to each other in a direction parallel to their plane of contact" as a better source of the term "wind shear"?

Bill Eberle
Huntsville, Ala.

Why not?

• Practical vs. Flight

In the May Flight Forum you advise a Swiss pilot of the tests that he must take to obtain an unrestricted U.S. commercial pilot certificate. Didn't you omit the "written and practical test" prescribed in Subpart D of Part 61?

William T. Boegel
Chelmsford, Ma.

It was not omitted; in our informally worded reply we said he would need to take the "written and flight test". The flight test, along with the oral review that accompanies it, comprises the "practical test".

• Grounded Airman

I have a pilot friend with a high blood pressure problem who was recently denied renewal of his medical certificate and is now grounded. Can I—with a valid certificate and current in type—ride as safety pilot for this man

Joseph G. Garibaldi, Jr.
Norwalk, Conn.

The only way you could legally fly with your grounded friend would be if you functioned as pilot-in-command. Since that makes you "responsible for the operation and safety" of the flight (FAR 1.1) you want to be very sure you can take over the flying duties, should he become incapacitated at any time during the flight.

• Logging Clarification

I am confused after comparing some of your Forum answers regarding the logging of pilot-in-command time. Several times you have made the statement that pilot-in-command time can be logged by both student and instructor.

However, recently you stated that "A student pilot does not log pilot-in-command time. Student flight time is logged either as solo flight time or instruction time." Which is right?

Name withheld
Seattle, Wash.

Both are correct. (See FAR 61.51). Note, however, that there is a difference in the meaning of the "student" and "student pilot" as used above. The "student" (who can log pilot-in-command time) is a private or commercial pilot, receiving instruction for additional certificates or ratings.

• Illinois Maintenance Seminar

We'd like to invite airplane and helicopter mechanics, pilots and owners to our Fifth Annual Illinois General Aviation Maintenance Seminar, which will be held at the Illinois State Fair Grounds (near the airport) at Springfield, Ill. November 14, 15 and 16, 1978.

Speakers include representatives from aviation companies and government, who will discuss latest maintenance procedures, tools and techniques. They will also set up displays and be available for personal consultation between sessions.

Admission is free and no preregistration is required. For further information write Illinois DOT, Division of Aeronautics, Springfield, Ill. 62707, or phone (217) 782-2884.

Charlie Wells
Springfield, Ill.

• Miami Radio

In your April issue you published a letter from a pilot who had difficulty closing a flight plan because he was unable to reach Nassau Radio when he was over Marsh Harbour, on Abaco. Please advise your readers that Miami Radio has a powerful remote on Grand Bahama Island (126.9, see Miami sectional) which can readily be reached to close (and file) flight plans down to about 3,000 feet MSL in the area of Marsh Harbour and Treasure Cay, Abaco.

William H. Karo
Miami, Fla.

For information on this service and all matters relating to flight to the Bahamas, we strongly urge pilots to get preflight briefings from personnel at the Miami International Flight Service Station, who are specially trained for the purpose.

FAA GENERAL AVIATION NEWS welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA GENERAL AVIATION NEWS, AFS-807, Washington, D.C. 20591.

• Oversight?

On the news page of your July issue, it was pleasant to see that a woman, Susan Dusenberry, has been granted an Inspection Authorization, but I was shocked to read in the caption under her photo that this "permits her to oversee annual inspections".

Have they changed the rules for Susan? As I recall, FAR 65.95 (a)(2) provides that "The holder of an IA may *perform* an annual, or supervise a progressive inspection . . ."

Jerry L. Toms
Elba, N. Y.

Negative on the rule change. Susan's IA allows her to perform *an annual inspection.*

INSTRUMENT CORNER

• Flight Plan Suffixes

It appears the handful of flight plan forms I picked up someplace in the past is obsolete—at least regarding the suffixes which are used after the aircraft type on IFR flight plans to denote avionics capability. This form shows my airplane (which has RNAV and transponder but no altitude encoder) as a "slant-F" but an FSS advises that on the current list I am now a "slant-C". Would you list the proper suffixes, please? Also—should I indicate on my flight plan that I have RNAV, even when I am not requesting an RNAV route?

C. C. Joiner
Newark, N. J.

The suffix list was revised within the past year to eliminate obsolete references (such as to the old 64-code transponder which is no longer legal for use). See current list below.

You should always indicate your RNAV capability on your flight plan. Sometimes a situation arises where ATC can, if they know you have the equipment, expedite your flight with an existing RNAV route.

Suffixes below are used after a slant-mark (/) following aircraft type (not N-number). Example, PA-28R/B

/X no transponder
/T transponder, no altitude encoder
/U transponder with alt. encoder
/D DME, no transponder
/B DME, transponder, no alt. encoder
/A DME, transponder with alt. encoder
/W RNAV, no transponder
/C RNAV, transponder, no alt. encoder
/F RNAV, transponder, alt. encoder

NOTE: Suffixes should always be used on VFR as well as IFR flight plans. ATC computer tapes, which are sometimes helpful in locating missing aircraft, can only be used if the aircraft transponder equipment is known.

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